90% DRAFT

Corrective Measures Design Report

Superior Tube Company
Evansburg, PA

17 August 1999

A2810.11.01

Environmental Resources Management
855 Springdale Drive
Exton, PA 19341

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1.0 INTRODUCTION

1.1 PURPOSE

This Corrective Measures (CM) Design Report has been prepared in accordance with the 25 February 1999 Corrective Measures Implementation (CMI) Program Plan and the requirements of the 28 December 1998 Final Administrative Order on Consent (AOC) between Superior Tube Company (Superior) and the United States Environmental Protection Agency (EPA).

1.2 BACKGROUND AND HISTORY

Superior is a specialty tube manufacturer with a facility located in Lower Providence Township, Montgomery County, Pennsylvania, at the intersection of Germantown Pike and Cross Keys Road (the Site). The 96-acre Site is located along French Run, a tributary of Perkiomen Creek (see Figure 1-1). Since 1935, Superior has owned and operated the facility for the manufacture of specialty, cold drawn, precision tubing and tubular parts. The principal operations include drawing, welding, degreasing, pickling, annealing, cutting, forming, grinding, polishing, coating, and sandblasting metal tubing. A facility layout map is provided as Figure 1-2.

The primary substance of concern at the Site is trichloroethene (TCE), a solvent that was used as a degreaser at the facility. Following the 1979 accidental release of 1,800 gallons of TCE from a carbon steel pipeline, contaminated surface water and soil were removed, the piping was replaced, and recovery wells and an air stripper were installed to treat the impacted ground water. The spill area, referred to as the Cross Keys Road area, is located at the north end of the facility near a storm water outfall (Outfall 004). Two additional air strippers, located west of the main facility, are being operated to treat recovered ground water containing TCE associated with unknown spills.

On 30 July 1990, Superior entered into an initial AOC with EPA to perform a RCRA Facility Investigation (RFI) and a Corrective Measures Study (CMS). The initial AOC also required Superior to implement any interim measures (IMs) that may be required to protect human health and the environment as directed by the EPA.

Figure 1-1
Site Location Map
Superior Tube Company
Evansburg, Pennsylvania

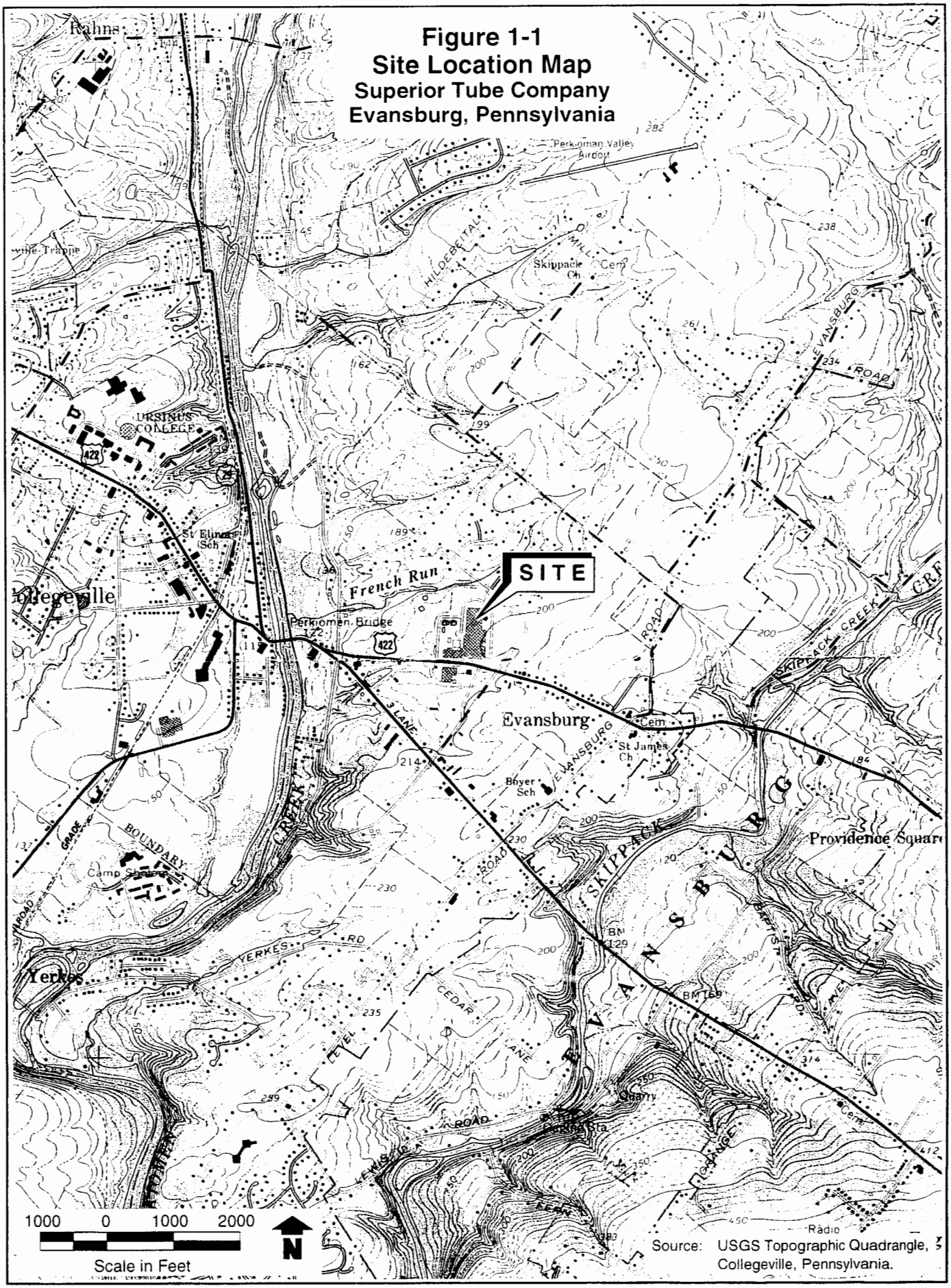
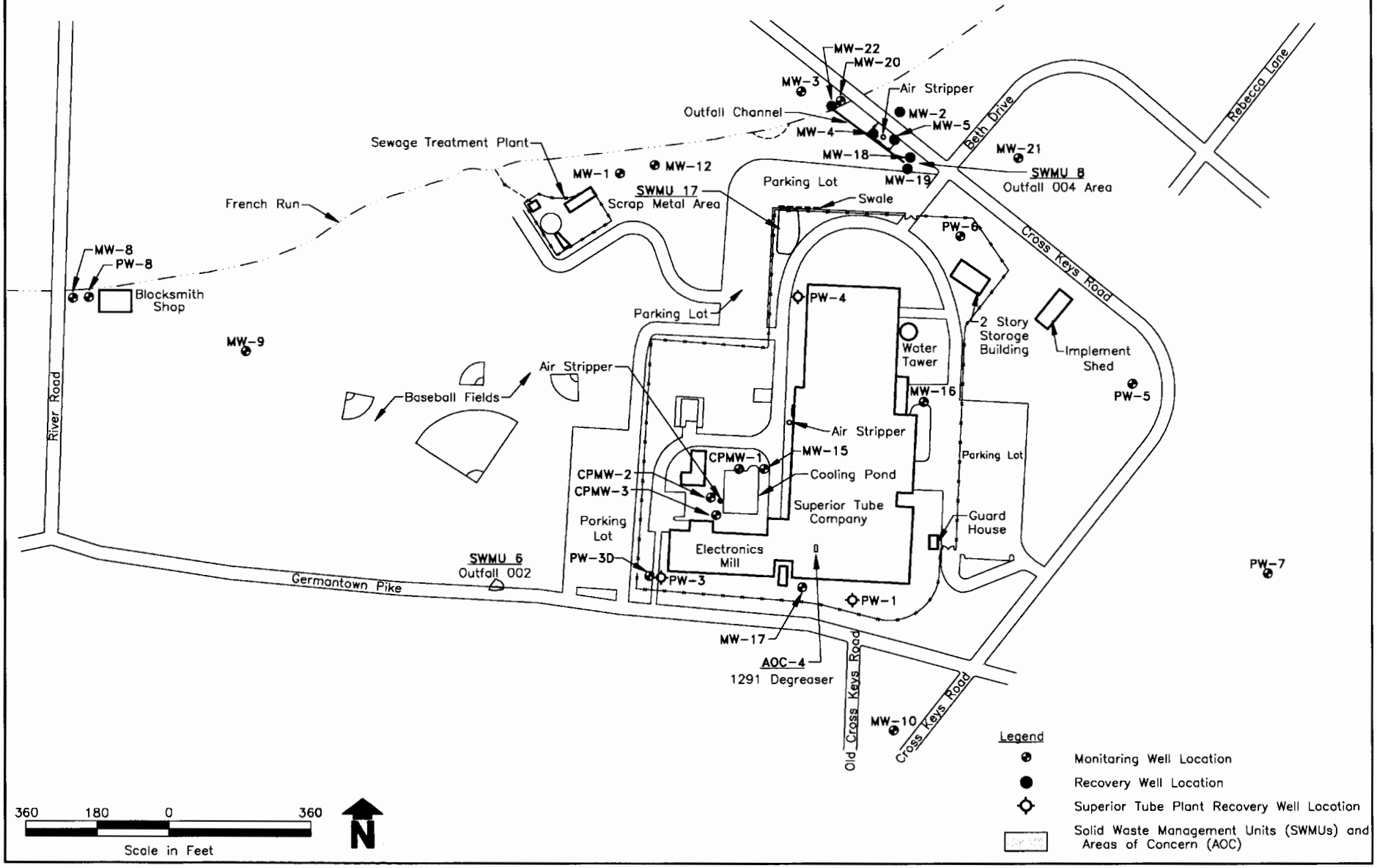


Figure 1-2
Facility Layout Map
Superior Tube Company
Evansburg, Pennsylvania



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An RFI Work Plan was prepared in 1990, and implemented during 1991 and 1992. In April 1991, Superior received notification from the EPA that Superior must perform IMs to address the presence of TCE detected in some wells of the Evansburg Water Company (EWC), the nearby water supply company. Superior subsequently implemented the approved IMs, which included expansion of the ground water recovery and treatment system, providing bottled water and carbon filters to local water users, periodic sampling and testing, and other activities.

The RFI was implemented during 1991 and 1992, and an RFI Report was completed and approved by the EPA. Based on the findings of the RFI, a CMS was conducted to evaluate potentially appropriate corrective measures for the facility. Superior subsequently submitted a CMS report to the EPA on 5 August 1993 to present the recommended corrective measures. On 30 September 1993, EPA issued a Final Decision and Response to Comments (FDRTC), which identified the corrective measures selected by the EPA. On 7 October 1993, the EPA gave Superior notice that no further revisions to the CMS report were required.

A second AOC became effective on 28 December 1998 in which Superior agreed to implement the cleanup activities required by the EPA. Pursuant to this second AOC, a CMI Program Plan was prepared to guide the design and implementation of the corrective measures and was submitted to the EPA on 25 February 1999.

Following EPA approval of the CMI Program Plan on 20 May 1999, preparation of the CM Design, which presents the detailed plans and specifications for implementation of the corrective measures, was initiated. A 50% design meeting between Superior and the EPA was conducted on 28 June 1999 to review the preliminary direction of the CM design, and approval to proceed with the CM design was received. This 90% Draft CM Design Report was subsequently prepared for agency review.

1.3 SCOPE

This CM Design Report has been prepared in accordance with the provisions of the 1998 AOC, particularly Section VI.B and Attachment A, Task II, to present the design for implementation of the corrective measures. Consistent with applicable EPA guidance (e.g., *"RCRA Corrective Action Plan, Final"*, May 1994, EPA 520-R-94-004), this design report makes use of, and incorporates by reference to the extent practical,

the various applicable plans and documents that have already been prepared and submitted to the EPA as part of the previous IM activities.

The remainder of this document is organized as follows:

- Section 2 presents the design basis for the interim measure and corrective measure activities.
- Section 3 details the corrective measures implementation.
- Figures, Tables and Appendices are attached and referenced where applicable.

2.0 *INTERIM MEASURE/CORRECTIVE MEASURE ACTIVITIES*

The Interim and Corrective Measures were developed to ensure the protection of public and private ground water supplies surrounding the facility, to remove any potential risks associated with contaminated soils and sediments at the facility and to protect future land and ground water usage. The following subsections detail the completed, ongoing, and proposed measures designed to achieve these goals.

2.1 *GROUND WATER PROTECTION*

As previously mentioned, the primary contaminant of concern in ground water at the Site is TCE. Although most nearby residences and businesses are now serviced by the Pennsylvania American Water Company (PA AWC), which provides drinking water from surface water sources only, Superior is actively removing TCE from site ground water to meet the applicable ground water quality standards, as defined in the 1998 AOC.

2.1.1 *TCE Remediation System*

The TCE remediation systems for ground water include the North Recovery System (NRS) and the South Recovery System (SRS). In accordance with the AOC, the CM Design has included an evaluation of the TCE remediation systems to assess their effectiveness, to identify any relevant data gaps, and to determine if any upgrades to the systems are needed.

Ongoing ground water sampling is conducted on a semi-annual basis to evaluate the performance and effectiveness of the recovery and treatment system. The sampling results are summarized into annual reports, prepared by SMC Environmental Services Group, and submitted to the Pennsylvania Department of Environmental Protection (PADEP) and EPA in February of each year.

The most recent ground water summary report was submitted to the PADEP and EPA on 16 February 1999. In general, the results reflect effective capture of the off-site TCE plume by the existing recovery systems, although average TCE concentrations increased slightly in a number of wells when comparing 1997 values to 1998 values. Suspected causes of these increases were reported to be below normal precipitation levels in 1998, and the termination of pumping of EWC-103 in March 1998.

More recent ground water sampling was conducted in April 1999, with the results reported to the EPA on 17 May 1999. TCE was not detected in 12 of the 13 residential taps sampled, and the one TCE detection (2.8 ug/l) was below EPA's Maximum Contaminant Level (MCL) for TCE of 5 ug/l.

2.1.1.1 North Recovery System

The North Recovery System (NRS) is located at the north end of the facility and includes monitoring wells MW-2, MW-4, MW-5, MW-18, MW-19, and MW-22, which recover impacted ground water from the Cross Keys area, and an air stripper which removes the TCE from the extracted ground water. The recovery wells pumped an average of approximately 48 gallons per minute (gpm) in 1998. The water from wells MW-2, MW-4, MW-5 and MW-22 is treated in the NRS air stripper, while the water from wells MW-18 and MW-19 is treated using activated carbon units.

To minimize regional aquifer depletion due to the pumping of ground water from the recovery wells, Superior evaluated the feasibility of re-injecting treated ground water into the aquifer. However, due to ground water mounding concerns, Superior instead recycles the treated ground water in its plant as process water. The PADEP issued an NPDES permit for Superior's reuse of treated ground water from several of the NRS recovery wells. All effluent discharge to French Run was discontinued in 1998.

The history of the NRS and its effectiveness has been affected by the historical presence of three pumping wells that belonged to the EWC. The original recovery system was limited to two shallow wells that pumped a few GPM at most. This was adequate when EWC drew all of its water from well EWC-101. Historically, as long as the NRS was pumping, well EWC-101 was free of contamination. However, when deeper well EWC-102 was installed to replace EWC-101, and demand for water increased as development occurred in the vicinity of the Site, the shallow NRS wells were no longer adequate to prevent migration of TCE to the public supply wells.

In addition to the above, EWC installed well EWC-103 approximately 2,000 feet northwest of the NRS in 1989. Mainly because of concerns about increasing migration of TCE, usage of this well was limited. However, even the limited usage of this well appeared to cause accelerated migration of TCE to the northwest. This was best illustrated by the history of monitoring at the D'Angelo residential well, where concentrations of TCE had been below the detection limits throughout the 1980s, but began to increase during the 1990s.

Because of concerns for the increased migration to both the northeast and northwest, deep wells 18, 19, and 22 were added to the NRS in the mid-1990s. Ground water modeling done for the IM evaluations in 1997 indicated that these wells provide excellent containment in the deep flow system. However, the modeling also indicated that containment was not being achieved in the shallow flow system for two reasons:

- Continuous discharge of treated ground water to French Run provided a constant source of recharge to the shallow system, preventing the deep recovery wells from dewatering the shallow system, and resulting in mounding that drove shallow flow toward well EWC-103.
- Well EWC-103 exhibited leakage down the borehole from the shallow to the deep system, even when it was not pumping. This further encouraged flow northwestward in the shallow system from the area of the NRS.

Since that time, the effectiveness of the NRS has improved as a result of the following events:

- Superior Tube has eliminated all discharges of treated ground water from former Outfall 004. Thus, recharge to the shallow system is now limited to infiltration of limited amounts of runoff and spring flow from upstream in French Run, during wet seasons.
- EWC has been sold to PA AWC, which has eliminated the use of wells EWC-101, 102, and 103. These wells are to be properly abandoned by cement grouting. This will ensure that well EWC-103 will no longer leak from the shallow system to the deep, eliminating any accelerated gradient. As discussed with the EPA during the 50% CM design review meeting, Superior is currently pursuing with PA AWC the possibility of leaving well EWC-102 open for a few more years to serve as an additional ground water monitoring point for the NRS.

To help evaluate the response of the ground water flow system to the recent changes discussed above, as well as to better reflect other current conditions (e.g., below average rainfall, current recovery rates), the ground water model for the Site has been updated and calibrated from recent water level data. The Twodan model was again used for this evaluation, as it can easily incorporate the changes that have been made to the hydraulics of the system by Superior Tube's and Pennsylvania American's actions. Additional background of the ground water model was provided with the 13 March 1998 Interim Measures Workplan for addressing conditions associated with EWC-103 (which has since been shut down).

The recent ground water modeling results are presented on Figures 2-1 and 2-2. As can be seen from these figures, and as opposed to previous modeling results during the period of EWC-103 pumping, the model indicates complete capture of the TCE plume area in the vicinity of the NRS. Additionally, water levels in the shallow and deep systems are slightly lower than during previous evaluations, reflecting effective dewatering of the shallow system and/or the recent below-average rainfall. The model also indicates discharge of the shallow aquifer to the deeper aquifer in the vicinity of the plant.

Based on the monitoring and modeling results, the existing data do not indicate a need to further upgrade the NRS pumping system, and no upgrades are proposed. Long-term monitoring of the system will continue to be conducted as discussed below in Section 2.1.1.3. Depending on the results of future ground water monitoring trends, additional wells (e.g., the Turner well) will be considered for inclusion into the NRS if appropriate.

2.1.1.2 South Recovery System

The South Recovery System (SRS) first went into operation in 1972, when contamination was reported at the Dye residential well across Germantown Pike, to remove TCE from impacted ground water in the southern portion of the facility. At that time, Superior Tube production wells PW-1 and PW-3 began pumping continuously to draw the TCE back to the plant property. The contamination in the Dye well abated by 1974, and continuous pumping ceased for several years. The SRS includes two air strippers for the treatment of TCE-impacted ground water that is recovered

In the late 1970s, contamination of the Dye well recurred, and continuous pumping for recovery was resumed. In the early 1980s, extensive ground water sampling/analysis was conducted at the residential and commercial wells along Germantown Pike and Ridge Pike. This sampling defined a plume of TCE contamination extending westward, roughly parallel to Germantown Pike, and terminating at the Perkiomen Creek. Some low-level contamination was also present to the south along Ridge Pike, and slightly to the east, along Germantown Pike.

Regarding the effectiveness of the SRS, the EPA has expressed concerns that the pumping of wells PW-1 and PW-3 may be insufficient to contain deeper TCE detected on the Superior property in well PW-3D during the IM work done in the mid-1990s. In response, and in accordance with the 1998 AOC, ERM has evaluated the existing data available to determine if

the SRS is adequate, or to define any data gaps that might exist for making that determination. In addition, ERM has evaluated the existing data to determine whether or not additional sources of TCE contamination, other than Superior Tube, are present along Germantown Pike or Ridge Pike.

Shallow Flow System

The database is adequate to evaluate containment in the shallow flow system, up to a depth of approximately 200 feet. Table 1 of Appendix H shows the construction of the Superior Tube wells and several off-site wells for both the NRS and the SRS. Recovery wells PW-1 and PW-3 are 385 and 196 feet deep, respectively. PW-1 is currently pumped at an average rate of 9.8 GPM and PW-3 at 14.7 GPM. The Speck's Drive In, Collegeville Chiropractic and Welsh wells are in the 125 to 150 foot-deep range. Other residential wells in the area are expected to be in a similar depth range to these wells and PW-3.

Figure 2-3 shows the configuration of the TCE plume along Germantown Pike and Ridge Pike in the 1979/1980 time frame, and Figure 2-4 shows the configuration of that plume today. In addition, Figures 1 through 7 of Appendix H show trend plots of TCE concentrations at certain off-site wells over the years. The data also indicate that concentrations of TCE at Speck's Drive Inn and the former Frank residence, which were in the apparent heart of the plume, have declined since 1980 from 6,400 ug/l to 13 ug/l, and from 21,300 ug/l to non-detectable, respectively.

Several important observations can be made from the above findings:

- In the early 1980s a high concentration TCE plume extended down Germantown Pike, to the west-southwest. This is consistent with the geology of the area, as a long, west-southwest trending strike-parallel surface swale runs along the axis of the high level contamination, as seen in 1980 (see Figure 2-3). A series of such strike parallel fractures can be seen as intermittent streams on the USGS Topographic Quadrangle, and on aerial photographs of the region.
- South of Germantown Pike, along Cross Keys Road and Ridge Pike, low level contamination was present in the early 1980s.
- By April 1999 (see Figure 2-4), the high concentration TCE plume has dissipated almost completely along Germantown Pike, under the influence of pumping at the SRS. This is consistent with events in the 1970s, when the contamination at the Dye well abated after only a couple years of continuous pumping. Clearly, the SRS is containing residual TCE contamination on-site, and retrieving the off-site plume.

- The low-level contamination along Ridge Pike has not declined to non-detectable levels at several wells. This is inconsistent with what would be expected, given the very dramatic abatement of contamination along Germantown Pike. It is also inconsistent with the response of the aquifer in the vicinity of the NRS, where pumping in the early 1980s quickly abated even the low-level contamination in downgradient residential wells.

The unexpected persistence of TCE south and east of Superior Tube has been evaluated. In those areas, not only TCE has been detected historically, but also 1,1,1-trichloroethane (TCA) and tetrachloroethene (PCE). The following table shows the ratios of these compounds to TCE for several wells in the SRS area on the Superior Tube property, and for several off-site wells.

	TCA/TCE*	TCA_{max}**	PCE/TCE*	PCE_{max}**
ON-SITE:				
PW-3	0.001	12.0	0.002	17
PW-3D	0.004	5.0	0.002	4.1
MW-17	0.003	11	0.003	11
PW-1	0.006	8.3	0.005	6.4
OFF-SITE:				
Hammond	0.17	16	0.09	2.1
Troxel Cem	0.22	8.2	0.31	5.3
Valynn Mfg.	0.13	8.4	0.07	7
Classic Coach	2.3	11	0.0	ND
Haraczka	0.97	20	0.0	ND
Evansburg Apt	.14	1.5	0.0	ND

* - Average for samples with TCE, TCA, PCE above detection limits

** - Maximum concentration in ug/l.

It can be seen that TCE and PCE are trace components of the contamination on-site, constituting at most a few thousandths of the concentrations of TCE. By contrast, off-site the ratios are 2 to 3 orders of magnitude higher, at all locations for TCA and at several locations for

PCE. Thus, it appears that there is at least one, and possibly more, sources of low level PCE and TCA off-site. In addition, the persistence of low-level TCE suggests that this compound also has one or more off-site low level sources. The following can be seen from the data:

- South of Superior Tube, at Valynn Manufacturing, the concentrations of the contaminants have not declined over time, suggesting that their source is at or close to that facility.
- East of Superior Tube, there appears to be a source of TCA and TCE, but not of PCE. Data from the Poole well, at 3851 Germantown Pike, showed the presence of up to 30 ug/l of TCE in the early 1980s, while all wells between that well and Superior had lower concentrations. TCA and PCE were never analyzed at the Poole well. However, across the street at 3852 Germantown Pike, 18 ug/l of TCA was detected in 1998. That concentration is higher than any ever detected in the SRS area on the Superior Tube property.

Based on the above, it is concluded that the Superior Tube southern off-site plume is limited to the contamination detected southwest of the SRS, along the strike parallel bedrock fracture that has channeled it in a very narrow flow pathway. That plume is dissipating under the influence of the SRS, which has contained the contamination on-site since the early 1980s.

Deep Flow System

The deeper flow system would be represented as that exceeding about 300 feet in depth. Superior Tube recovery wells PW-1, PW-4, and PW-5 are all deeper than 300 feet. They pump a total of approximately 50 GPM from the shallow and deep systems combined, whereas PW-3 pumps about 15 GPM from the shallow system alone.

Consistent with the evaluation of the NRS, the ground water model was updated and calibrated for current conditions in the vicinity of the SRS. As can be seen from Figures 2-1 and 2-2, the model indicates the effective capture of the off-site TCE plume by the SRS in both the shallow and deep zones. The large canoe of depression indicated by the model is consistent with previous cone. - cone

As a result of the above evaluation, it is concluded that no upgrade to the SRS is needed at this time to enhance containment/remediation in either the shallow or deep flow system. Long term ground water monitoring (discussed in Section 2.1.1.3, below) will continue to track the further progress of the very successful off-site aquifer remediation program. The

in-situ vacuum extraction system (ISVE) to be operated (discussed below in Section 2.2) is also expected to support the remediation of TCE in the vicinity of the SRS and south of Germantown Pike.

2.1.1.3 *Ground Water Monitoring*

Long-term ground water monitoring of on-site and off-site wells will continue according to currently established plans until it is determined that the media cleanup criteria presented in the AOC are met. The most current plans for residential well sampling were presented in the Residential Well Sampling Program Final Report which was provided to the EPA on 13 January 1999. If any changes to the sampling program are warranted in the future, plans for such proposed changes will be submitted to the EPA for approval in accordance with the provisions of the AOC.

2.1.2 *SWMU 21*

An additional issue related to ground water protection at the Superior facility involves the recovery and treatment of low-pH ground water in the vicinity of the waste acid handling facility (SWMU 21). A ground water chemical precipitation unit is currently treating contaminated ground water in the vicinity of the waste acid handling facility (SWMU 21), since the contamination discovery in 1996. The treated effluent is added to Superior's industrial wastewater flow for final treatment prior to discharge through a permitted outfall, and ground water is periodically sampled from five nearby monitoring wells.

Ground water impacted from a leaking process tank in the acid pickling facility near SWMU 21 is also being addressed as part of the SWMU 21 recovery and treatment system. A basement sump located near the wall under the acid pickling facility was identified as the source of low pH ground water, due to leakage of acid contamination from a lined trench, conveying spent acid bath. The drain from the sump was plugged, and ground water is being recovered from the sump for treatment in the existing treatment system for SMWU 21.

As reported in the most recent semi-annual monitoring report for SWMU 21 (22 April 1999), the monitoring results document an improving trend in ground water quality, with a continuing decrease in copper and fluoride levels and a corresponding pH increase in the treatment system influent. Also, the monitoring wells continue to show no evidence of contamination. The continued improving trend in the sampling data supports the conclusion that the interim measures were appropriate and

effective, and that additional investigation and remediation (beyond continued operation of the existing system) is not warranted at this time.

Operation and monitoring of the SWMU 21 recovery and treatment system will continue according to established plans, except that recovered ground water will be directed to the new on-site wastewater treatment facility when it is completed (expected within the next few months). The next annual sampling report for the SWMU 21 area will be submitted to the EPA in October 1999. The report will provide an update of any new information acquired regarding the SWMU 21 area, analytical results from the acid-contaminated sump and outfall, and any changes to the acid pickling facility. Operation of the SWMU 21 recovery and treatment system will be terminated when the cleanup criteria established in the AOC is achieved.

2.2 *IN-SITU VAPOR EXTRACTION*

As detailed in the EPA-approved 7 August 1996 Pilot In-Situ Vapor Extraction (ISVE) Work Plan, prepared by Environmental Alliances, Inc. (Alliance), the effectiveness of using ISVE to remove TCE from the unsaturated (vadose) zone beneath the facility will be evaluated through pilot testing. The proposed ISVE pilot test will utilize air extraction and monitoring wells to test the effectiveness of this technology in removing adsorbed-phase TCE from the shallow soils and impacted bedrock beneath the central portion of the facility. As discussed with EPA, a pre-pilot study was previously conducted, and initial results were promising.

Additions to the ISVE withdrawal network were completed in July 1999 during a period of plant shut-down. The ISVE set-up and pilot testing is scheduled to begin in fourth quarter 1999 pending the receipt of the required air emission control equipment. The results of this study will be used to determine whether or not a full-scale ISVE system should be implemented. Additional details are available in the ISVE Work Plan which was approved by the EPA on 23 April 1999.

2.3 *SOIL AND SEDIMENT EXCAVATION*

Pursuant to Attachment A, Section C of the AOC, the CM activities will include the final delineation, excavation, and off-site disposal of impacted soils within Solid Waste Management Unit 17 (SWMU 17), the Scrap Metal Storage Area. Soils that exceed the media-specific cleanup standards

presented in the AOC, down to a maximum depth of three feet, will be excavated and transported off-site for proper recycling or disposal.

Delineation sampling will be conducted to verify the lateral extent of soils that exceed the media-specific cleanup standards prior to excavation so as to minimize the duration of open excavations and facility disruption that would otherwise be required while waiting for post-excavation sampling results prior to backfilling, and the potential need for additional excavation. Pre-excavation delineation will also enable better planning of equipment and materials required for the project. In addition, waste classification samples will be collected prior to excavation so that an appropriate off-site recycling or disposal facility can be confirmed, and the waste stream accepted. To avoid redundancy, post-excavation samples will only be collected in locations where the pre-excavation delineation samples may not have fully defined the extent of excavation and constituent concentrations to remain in place.

Because the surface and subsurface overburden materials at SWMU 17 and surrounding areas has been characterized as imported fill, constituent concentrations detected in SWMU 17 delineation samples may be representative of background conditions, rather than former operations at SWMU 17. If this condition is revealed through the delineation sampling, and the volume of materials exceeding the media-specific cleanup standards is significantly greater than the 150 cubic yards estimated in the AOC, Superior may petition the EPA for consideration of an alternate remediation approach.

Following excavation, excavated areas will be backfilled with imported clean soil, and capped with asphalt to prevent future exposures to constituents that are left in place.

Surface soils and sediments that exceed the applicable media-specific cleanup standards in the vicinity of Outfalls 002 and 004 (SWMUs 6 and 8, respectively) will also be excavated and transported off-site for disposal. As discussed above for SWMU 17, delineation sampling will be conducted prior to excavation so as to enable better planning and quicker backfilling and restoration. Because the vertical extent of excavation required was not defined by the AOC or previously sampling activities, delineation samples will include subsurface sampling. Again, post-excavation samples will only be collected in locations where the pre-excavation delineation samples may not have fully defined the extent of excavation required in all directions.

Based on a comparison of constituent concentrations detected in surface soils and sediments at Outfalls 002 and 004 to the AOC media cleanup standards (see Appendix D), benzo(a)pyrene is the sole constituent of concern. Because the outfall areas both receive runoff from paved surfaces and roads that are not associated with the operations of Superior, and because benzo(a)pyrene is a component of car exhaust and a common contaminant in roadway runoff, it is possible that the presence of benzo(a)pyrene in the outfall areas is at least partially a result of such runoff. If widespread benzo(a)pyrene contamination is revealed through the delineation sampling, and the depth, area and/or volume of materials exceeding the media-specific cleanup standards is significantly greater than that estimated for this CM design (see Appendices A and D), Superior may petition the EPA for consideration of an alternate remediation approach prior to excavation.

Following excavation, excavated areas around Outfall 002 and Outfall 004 will be backfilled with imported clean soil, and vegetated or otherwise stabilized against erosion as applicable.

Details of the delineation sampling and analysis activities are presented in the Field Sampling Plan, which is included as Appendix D of this report. Excavation, backfilling, and site-restoration activities are detailed in the technical specifications and drawings, which are included as Appendix A to this report.

2.4 *INTERIM MEASURES # 3*

Interim Measures #3 (IM#3) was initiated in early 1996 to investigate the source of elevated TCE levels in water discharged from Outfall 004. The investigation activities indicated that a cracked storm drain box at the acid house loading dock (SWMU 18 area) had resulted in TCE contamination in the storm drain. To address this condition, soils in the vicinity of the storm drain box were excavated, perched water containing TCE was extracted and treated from four extraction wells using a high-vacuum pump, and additional monitoring wells were installed and sampled. The remediation system installation was completed in January 1997.

Based on the removal of TCE impacted soils by excavation, the treatment of TCE-impacted soils through vacuum extraction and carbon treatment, the extraction and treatment of TCE-impacted perched ground water, and the reengineering of the drain, Superior has met the cleanup objectives of the IM Work Plan. Additional details regarding IM#3 are presented in the 9 February 1999 Quarterly Monitoring Report prepared by Environmental

Alliance, as well as previous related reports and work plans. As reported in the 20 May 1999 letter from the EPA, EPA concurs with Superior's conclusion that IM#3 has met its cleanup objectives, and IM#3 has therefore been terminated.

2.5 *INSTITUTIONAL CONTROLS*

Pursuant to Attachment A, Section D of the AOC, Superior will implement institutional control measures to ensure protection of human health and the environment during and after implementation of the corrective measures. These activities will include preventing unauthorized site access or construction in areas which could interfere with the effectiveness of the corrective measures, notifying local authorities that impacted ground water exists in the vicinity of the facility, and preventing the installation of drinking water wells within the area of impacted ground water.

To address these concerns, a Deed Notice will be appended to the property deed to restrict potential future site activities which could result in the disturbance of the remedial components or waste, or which could result in unacceptable exposure risks. A draft Deed Notice is presented in Appendix F to this report. The final Deed Notice will be developed during corrective measures implementation, following approval of this CM Design Report. The final Deed Notice will be filed with the County and maintained with the property deed.

3.0 CORRECTIVE MEASURES IMPLEMENTATION

3.1 PROGRAM MANAGEMENT PLAN

3.1.1 Project Organization and Responsibilities

In general, Superior is responsible for implementing all requirements of the AOC. Mr. William Sterrett, Manager of Environmental Services at Superior, is the manager and primary point of contact regarding the corrective measures. As appropriate, consultants, contractors and laboratories support Superior with portions of the corrective measures implementation.

EPA is the lead agency for oversight and approval of the corrective action activities. EPA's RCRA Project Manager is Khai Dao. The PADEP also oversees the work and supports the EPA, and is represented by Nancy Roncetti. A general organization chart for the CMI phase of the project was provided in the 25 February 1999 CMI Program Plan.

3.1.2 Schedule

The proposed schedule for implementation of the CMI activities is presented on Figure 3-1. This schedule was developed based on the requirements and timeframes presented in the AOC and CMI Program Plan, assumptions from previous experiences, and the current understanding of the project implementation requirements. As discussed with EPA during the 50%design meeting, the CM soil excavation and related activities are proposed to begin in Spring 2000, so as to avoid unfavorable weather conditions expected during the Winter. If schedule changes are required during the course of the project implementation, the EPA will be properly notified and a revised schedule will be provided. Additional details regarding scheduling and implementation of the corrective measure activities is provided below in Section 3.7.

3.2 COMMUNITY RELATIONS

In accordance with the AOC requirements and EPA's September 1993 "RCRA Public Involvement Manual" guidelines, a RCRA Corrective Actions Community Relations Plan (CRP) was submitted by ERM to the EPA as part of the CMI Program Plan on 25 February 1999. Following

EPA approval, a copy of the CMI Program Plan and CRP were sent to the Lower Providence Library, in Eagleville, PA, on 24 June 1999, to supplement the local community's information files and ensure that the people who live and work in the vicinity of the facility are aware of the RCRA activities.

At the completion of the CM Design phase (i.e., following EPA approval of the CM Design), a public notice and an updated fact sheet will be prepared and distributed. Draft copies of these documents will be provided to the EPA and PADEP for review and comment prior to distribution to the public.

3.3 *SAMPLING AND ANALYSIS PLAN*

Significant sampling and analysis activities are currently being conducted as part of the ongoing IM activities. These activities include semi-annual sampling of on-site ground water recovery wells and local residential wells, as detailed in Superior's 13 January 1999 Residential Well Sampling Program. Sampling and semi-annual reporting of the SWMU 21 recovery and treatment activities will also continue according to current plans. These current plans are incorporated herein by reference, and are not repeated in this document.

In addition to long-term, periodic ground water sampling, soil and sediment delineation samples will be collected from SWMU 17 and Outfalls 002 and 004, as part of the CM implementation activities. These sampling activities are detailed in the Field Sampling Plan, which is provided as Appendix D to this Design Report.

3.4 *HEALTH AND SAFETY*

Appropriate Health and Safety (H&S) measures will be undertaken during all CMI activities. The specifics are detailed in the Health and Safety Plan, provided as Appendix B to this CM Design Report.

3.5 *CORRECTIVE MEASURES PERMITTING PLAN*

Various permits and approvals have been previous obtained by Superior to facilitate implementation of the previous interim measures and related activities. The additional soil and sediment sampling and excavation activities included in this CM Design are relatively limited, and therefore

permitting and approval of the CM activities is expected to be relatively straightforward. In accordance with the AOC, the CMI Program Plan, and the schedule presented as Figure 3-1, Superior will proceed with obtaining the necessary permits and approvals for completion of the work following EPA approval of this CM Design Report.

The anticipated permits and approvals required for implementation of the CMs consist of the following:

- Because of the soil disturbance associated with the soil and sediment excavation activities, a Soil Erosion and Sedimentation Control Plan must be developed in accordance with 25 Pa Code, Chapter 102. Because this project is being conducted under regulatory oversight, The Erosion and Sedimentation Control Plan will be submitted to the Montgomery County Conservation District for review and approval prior to the initiation of work. Proposed erosion and sediment control measures are presented in Appendix A of this CM Design Report.
- The PADEP will be contacted regarding any potential wetland or stream encroachment permits that may be required to implement the excavation activities in the vicinity of Outfalls 002 and 004 due to the nature of the vegetation and drainage ways that exist near these areas. It is expected that the limited nature of the activities will warrant a waiver of any permit requirements, or a State Programmatic General Permit (PASPGP-1) could likely be obtained if required.
- The appropriate waste acceptance approvals will be obtained prior to the off-site transportation and disposal of excavated materials.
- Access and similar agreements with other entities (e.g., PA AWC for issues associated with the potential use of EWC-102 for monitoring) and off-site property owners will be pursued by Superior as necessary for implementation of the work.

3.6 *GROUND WATER/AIR EMISSIONS MONITORING PLAN*

As required by Attachment A, Section F of the AOC, Superior will implement a Ground Water/Air Emissions Monitoring Plan to determine the applicability of the 40 CFR 265 Subpart AA standards regarding air emissions from the existing air strippers, and to determine if any additional controls are required to meet any applicable standards. The details of this plan are presented in Attachment A, Section F of the AOC and are hereby incorporated by reference. Implementation of the Ground Water/Air Emissions Monitoring Plan is scheduled to begin in late August or early September.

Consistent with the AOC, the sampling program will only include those wells that recover water that is pumped through one of the three on-site air strippers for treatment. It should also be noted that potential air emissions have decreased from previous estimates because some of the wells previously assumed to be treated through the air strippers (e.g., MW-18 and MW-19) are now being treated with granular activated carbon (GAC) and recycled for use as plant process water.

3.7 *CORRECTIVE MEASURES IMPLEMENTATION*

As required by the AOC, the corrective measures implementation will be initiated within 60 calendar days following the receipt of agency approval of this CM Design Report (pending favorable weather conditions and the ability to receive the required approvals), and will include the following sequence of activities:

- delineation sampling of the SWMU 17 and Outfall 002 and 004 areas;
- attainment of the required permits and approvals;
- development of a bid package (utilizing the technical specifications, drawings and plans presented in this CM Design Report as a basis), and the solicitation of bids from a number of qualified firms;
- bid evaluation, construction contractor selection and contracting;
- mobilization;
- establishment of erosion and sediment control measures in excavation areas;
- excavation of impacted soils and sediments exceeding the media cleanup criteria in the vicinity of Outfalls 002 and 004;
- excavation of impacted soils and sediments exceeding the media cleanup criteria within SWMU 17, down to a maximum depth of 3 feet;
- post-excavation sampling in any locations not defined by the pre-excavation delineation sampling;
- loading and off-site disposal of excavated materials;
- backfilling of excavated areas with imported clean fill;
- stabilization with erosion matting and/or vegetation in Outfall 002 and Outfall 004 areas disturbed by excavation activities;
- placement of an asphalt cover over the backfilled SWMU 17 excavation area; and

- removal of erosion and sedimentation control measures.

All field work will be conducted in accordance with the site-specific Technical Specifications and Drawings, Health and Safety (H&S) Plan, Quality Assurance Project Plan (QAPP), Field Sampling Plan (FSP), Operation and Maintenance (O&M) Plan, and Construction Quality Assurance Plan (CQAP) presented in Appendices A, B, C, D, E, and G of this Design Report, respectively.

3.8 *ADDITIONAL IMs*

In accordance with Section VI.I of the AOC, Superior will identify and implement any additional activities required to address any immediate threats to human health and the environment identified or uncovered during completion of the CM Design activities. Notification procedures, development of IM Work Plans, and IM implementation will be conducted according to the provisions of Attachment B of the AOC.

3.9 *PROGRESS REPORTING*

In accordance with the AOC and CMI Program Plan, progress reports will be submitted to the EPA on a quarterly basis, except those quarters for which an annual report is due (i.e., February of each year). The progress reports will summarize all work activities conducted during the reporting period. The annual reports are more extensive and include the results of the bi-annual ground water sampling events.

Five-year assessment reports will be submitted every five years, the first one being due five years after the AOC became effective (i.e., on 28 December 2003). These assessment reports will present the status of the corrective measures implementations.

3.10 *COST ESTIMATE*

In accordance with the requirements of Attachment A, Section C of the AOC, an estimate of the corrective measures implementation costs is presented on Table 3-1. Per the AOC, the engineer's cost estimate includes capital and O&M costs. Consistent with standard EPA Guidance, the present worth of the O&M costs was calculated assuming a 5% discount (interest minus inflation) rate.

The cost estimate was developed based on the current level of project understanding, utilizing existing Site plans and engineering judgment. To be conservative, all costs include a 15% contingency, and O&M costs assume that 30 years of O&M will be required for the ground water recovery and treatment system (5 years of O&M were assumed for the ISVE system). Actual costs could vary based on final soil and sediment delineation results, actual excavation and disposal volumes, disposal approvals, ground water recovery rates, monitoring results, potential system upgrades, longer or shorter operation periods, changes in regulations, and the like. The cost estimate assumes that the Ground Water/Air Emissions Monitoring Plan concludes that air emission controls are not necessary on the air strippers.

Table 3-1
Cost Estimate Summary for Corrective Measures
Superior Tube Company
Evansburg, PA

Area	Interim Measure/ Corrective Measure	Capital Cost	Annual O&M	Present Worth of Capital+O&M*
SWMU 6 - Outfall 002	Excavate 8 cubic yards	$15,000	$0	$15,000
SWMU 8 - Outfall 004	Excavate 30 cubic yards	$20,700	$0	$20,700
SWMU 10-TCE stripping towers				
#3528 Air stripper	Continue Operation	$0	$5,000	$76,900
#3543 Air stripper	Continue Operation	$0	$5,000	$76,900
SWMU 11-TCE stripping tower #3542 (Cross Keys Rd)	Continue Operation	$0	$5,000	$76,900
SWMU 17-Scrap metal area	Excavate 150 cubic yards, and re-pave	$40,300	$755 (every 5 years for pavement)	$42,400
AOC 4-#1291 degreaser area	In-situ vacuum extraction pilot study and operation	$250,000	$30,000 (for 5 yrs)	$379,900
Miscellaneous	GW/Air emmisions monitoring	$35,000	$5,000	$111,900
	Semi-Annual GW Monitoring	$0	$30,000	$461,200
	Engineering support, plans	$100,000	$0	$100,000
	Totals	**$461,000**	**$80,755**	**$1,361,800**

* Present worth cost based on 5% discount rate (i.e., interest rate minus inflation rate), and 30 yrs of operation and maintenance.
Excavation volumes could vary based on delineation sample results.
Costs could vary based on actual excavation volumes, disposal classification, duration of operation and maintenance, and other factors.